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IDENTIFIERS *Cement; Cement Masons; Drywall Construction; Plasterers; *Plasters; Preapprenticeship Programs; Tile Occupations

ABSTRACT

This self-paced student training module on trowel trade materials is part of the course, Trowel Trades, which was developed for Preapprenticeship Phase 1 Training. (A companion instructor's guide is available separately as CE 032 868.) The course is designed to provide students with an orientation to the trade and an opportunity to explore it. The purpose of the module is to teach students to identify and describe types, characteristics, and uses of basic materials of the trowel trades. The module may contain some or all of the following: a cover sheet listing module title, goal, and performance indicator; study guide/checklist with directions for module completion; introduction; information sheets providing information and graphics covering the module topic(s); supplementary references; self-assessment; self-assessment answers; post assessment; and post-assessment answers. (YLB)

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ED217235

INDIVIDUALIZED LEARNING SYSTEMS

PRE-APPRENTICESHIP
PHASE 1 TRAINING

TROWEL TRADE MATERIALS

Goal:

Upon completion of this module, the student will be able to identify and describe types, characteristics and uses of basic materials of the trowel trades.

Performance Indicators:

The student will demonstrate his or her knowledge of successfully completing both a Self Assessment and Post Assessment covering identification of the types, characteristics and uses of basic materials of the trowel trades.

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Study Guide

To successfully complete this module, complete the following tasks in the order listed. Check each one off as you complete it.

1. ____ Read the Goal and Performance Indicators on the cover of this module. This will inform you of what you are expected to gain from completing this module and how you will demonstrate that knowledge. Read the Introduction section to understand why this module is important.

2. ____ Study the Information section of this module to acquire the knowledge necessary to complete the Self and Post Assessment exams.

3. ____ Complete the Self Assessment exam and compare your answers with those on the Self Assessment Answer Sheet on the page immediately following the exam. Re-study or ask your instructor for help on any questions you have trouble with. The Self Assessment exam will help you determine how well you are likely to don on the Post Assessment.

4. ____ Complete the Post Assessment exam and turn your answers in to your instructor.

Introduction

There are more and more porducts available to use in the trowel trades. The student must be able to recognize what type of material to select for the job. Careful selection of materials is the key to successful work. Selecting and mixing the wrong materials will invite problems and poor results.

Information

PLASTER MATERIALS

Plaster materials fall in to two broad categories: 1) those that are used as bases for receiving the plaster and 2) those that make the plaster product itself.

Base Materials -- 5 common types

1. Gypsum board lath--a specially prepared form of gypsum which is pressed into sheets of various sizes and thicknesses with special paper covering. It may be perforated to improve bonding.
2. Metal lath--made of galvanized steel or wire, this material is designed to provide the best mechanical bond for plaster.
3. Welded or woven-wire paper base--absorbent paper mateiral with wire interwoven in the paper. This base is often used with machine applied plaster.
4. Masonry bases--materials such as cinder blocks, brick, rock or concrete may be the base for plaster surfaces. Sufficient bonding must be assured and therefore special bonding agents may be required to insure the plaster's hold to the base material.
5. Wood lath--thin strips of wood are nailed to framework. Formerly the most common base, it is seldom used today.

Plastering Materials

1. Gypsum--processed gypsum rock that comes in 100-lb. bags as a dry powder.
2. Lime--processed limestone rock supplied as a dry powder in 50 to 60 lb. bags. This ingredient is used to provide plasticity (pliability) to plaster and to retard drying.
3. Portland cement--a product made primarily from lime, silica, iron oxide and other ingredients; generally available as a dry powder in 94-lb. bags. Portland cement is a common ingredient in concrete, exterior plaster and

plasters subject to moisture exposure.

4. Aggregates--such materials as sand, wood fibers, perlite and vermiculite are often added to plaster mixtures to provide bulk and increase coverage. They may also provide surface texturing properties.

Manufactured Plaster Products

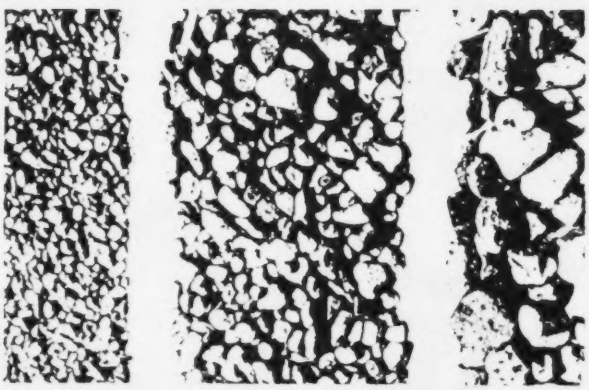
1. Neat Gypsum--this is dry gypsum without aggregate or additives that is generally used for base coat plaster.
2. Gauging Plaster--Specially ground gypsum plaster with well defined (so you can "gauge") setting properties (time). Allows improved control of plaster's set.
3. Molding Plaster--this is finely-ground gauging plaster, often used for decorative and/or detail work.
4. Keenes cement--not really cement, but a high strength white gypsum used for finish coats.
5. Wood fibered gypsum--neat gypsum with special wood fibers premixed. It is often used as a scratch coat over metal lath.
6. Finishing limes--ingredients used to provide bulk, plasticity and easier spreading of finish coat plasters.
7. Admixtures--these are ingredients that are added to the plaster mix such as setting agents, bonding agents and fire-retardant substances. They are used to vary setting time, improve the plaster's bond or increase fire resistance.

CEMENT FINISHING MATERIALS

There are two significant categories in cement finishing materials: 1) those that comprise the concrete itself and 2) those that make up the concrete forms.

Concrete Materials

1. Cement--generally Portland cement, made from lime, silica, iron oxide and other ingredients. Available as a dry powder in 94-lb. bags. This material has high compressive strength but low tensile (stretching) strength and therefore must be steel reinforced when tensile strength is required for concrete product.
2. Aggregate-this provides the bulk in concrete. It is comprised of sand, stone and gravel. Fine aggregate is 1/4" or smaller while coarse is larger than 1/4".



COARSE AGGREGATE

SAND AGGREGATE

3. Additives--ingredients added to the concrete mix that fall into five major categories.
   a. Coloring agents that are usually added as dry powders when mixing.
   b. Air-entraining agents. These are designed to introduce small air bubbles into concrete to improve freeze-thaw characteristics.
   c. Hardening agents. Used to improve concrete strength characteristics.
   d. Setting agents. Used to regulate concrete setting time.
   e. Curing agents. Used to regulate the hydration (curing) process for curing concrete.
4. Water--Clean and used in varying amounts; final ingredient added to dry concrete mix.

Form Material

Wood and metal material used to construct forms for holding wet concrete in the desired shape until it sets. Construction lumber and plywood are most commonly used.

BRICKLAYING MATERIALS

Bricklaying materials fall into three major categories: 1) masonry units, 2) mortar, 3) anchors and ties.

Masonry Units--They fall into four major categories.

1. Bricks--manufactured clay masonry or ceramic materials that come in a wide range of colors and surface textures. Sizes generally fall within the following range: 3" to 12" thick; 2" to 8" high, and lengths to 16" are common. They

are used to form solid or hollow walls that are either load or non-load bearing. Depending on bond (laying pattern), they may also provide a decorative surface texture or pattern. Bricks are also used in walkways, decks, flooring and fireplaces.

2. Hollow clay tile--these tiles have a wide range of uses from load and non-load bearing walls and partitions to decorative screens and wall facing treatments.

   They are considered hollow tile if each unit has a net cross-sectional surface area (measured parallel to bearing surface). Sizes range from 3" to 8" thick, 5 1/2" to 12" wide and 8", 12" or 16" long (all dimensions are nominal). for structural clay tile, while structural facing tile is available in modular (4" multiple) dimensions.

3. Blocks--The two main types haere are concrete and glass blocks, both sized on 4" modular dimensions.

   Concrete block is available in a wide range of sizes and shapes and may be solid or hollow construction. They are used to construct bearing and non-bearing walls. They are inexpensive, have good insulating, sound-reducing properties, are resistant to fire and weathering and are very available.

   Glass block is available in functional, general purpose and decorative categories. They are used to allow varying and controlled light transmission, in addition to their decorative properties.

4. Stone--there are 4 categories of stone used in masonry.
   a. Igneous--primarily granite.
   b. Sedimentary--sandstone, limestone.
   c. Metamorphic--marble, slate.
   d. Manufactured or "man-made stone," used to simulate natural stone.

   Usually, stone is highly irregular in shape and provides a decorative surface pattern and/or texture. The irregular shape means it is slower and more difficult to use than fabricated masonry units.

   Stone is often used as veneer, or in trim and floor and paving applications. It's occasionally used for foundations, exterior walls and chimneys, though less frequently now than in the past.

Mortar--the primary bonding material used between masonry units. It is made of varying proportions of Portland or masonry cement, sand, lime and water where total aggregate to cement/lime ratio is not less than 2 1/4 and not more than

3 1/2 times the volume of cement and lime used. Mortar is usually greyish in color but may be white or colored by using white cement and pigments for color. It may be used for plain or reinforced applications.

Mortar must present the following seven characteristics to be satisfactory:

1. Workability--spread easily, cling to vertical surfaces and extrude easily (be pressed out) without drooping or smearing.
2. Water retentivity--ability to resist rapid water loss.
3. Consistent rate of hardening, which allows for laying out units and tooling joints to the same degree of hardness.
4. Bond--tensile strength required to separate units, which is determined by the extent of contact between mortar and masonry units.
5. Durability--the ability to withstand exposure (weathering).
6. Strength--the ability to withstand compressive loads (downward forces) exerted on masonry structures.
7. Appearance--uniform color and shade from batch to batch.

Anchors, Ties and Reinforcements --consisting of metal wire, rod and formed bars and specialized fabrications of these materials which are used to provide tensile strength and to tie walls, partitions and other building units together.

TILE SETTING MATERIALS

Materials used by tile setters fall into 6 major categories: 1) tiles, 2) grouts, 3) mortars, 4) mastics, 5) sealers and 6) screeds. Care must be taken to follow individual product directions for use as recommended by the manufacturer for each material used.

Tiles--These are available in a wide range of colors, surface texture and sizes. They fall into the following groups:

1. white clay back
2. porcelain mosaics
3. natural clay mosaics
4. quarry tile
5. soft backed glazed quarry tile
6. vitrous tile
7. glass mosaics

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Grouts--The materials used to fill the joints between tiles. They are formulated for different applications and appearances. The major types of grout are:

1. wall type
2. natural cement
3. pre-mixed color
4. sanded
5. non-sanded
6. expoxy
7. furnane grouts

Mortars--This material comes in two main types: floor and wall mixtures. They are both designed to provide a level interediate surface on to which the tile is bonded.

Mastics--The materials used to provide adhesion between tile and sub-surface. Mastics are formulated in a wide variety of types to provide specific properties for different applications and/or tiles being used. There are six major types of mastic:

1. wall mastic
2. floor mastic
3. thinset mastic
4. expoxy mortar
5. acrylic thinset
6. latex mortar

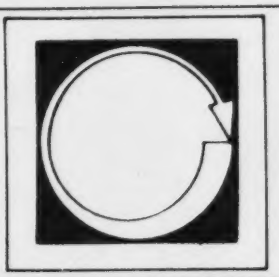
Sealers--designed to protect the tile's surface once it is set. Sealers fall into six major categories:

1. wax
2. acrylics
3. latex
4. solvent base
5. silicone
6. emulsion

Sealers are an optional material in most tilesetting projects. Unless they are applied correctly they can cause appearance and structural damage. Many contractors avoid using sealers at any time.

Screeds--Generally a wood lattice configuration that is used to provide a leveling guide when applying mortars.

Self Assessment



Answer the following questions.

1. What is the least common base material for plaster today?

2. Name at least 3 types of manufactured plaster products.

3. Mane at least 2 types of admixtures for plaster.

4. Is Keenes cement actually cement?

5. Concrete has high tensile/compressive strength. (Circle the correct answer.)

6. At what point does aggregate for concrete change from being graded fine to being graded coarse? 1/10" 1/4" 1/4" 1" in diameter. (Circle the correct answer.)

7. How many major categories of additives for concrete are there?

8. How do air-entraining agents improve concrete?

9. What does it mean to say 4" modular masonry units?

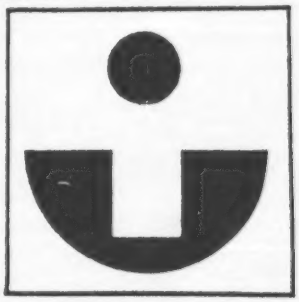
10. Why is stone more difficult to use in masonry work?

11. What is mortar used for in bricklaying?

12. What are the six major categories of tile setting materials?

13. Are grouts used to provide adhesion between subsurface and tiles?

Self Assessment Answers



1. wood lath

2. any three: neat gypsum, gauging plaster, molding plaster, keenes cement, wood fibered gypsum, finishing limes, admixtures.

3. any two: setting agents, bonding agents, fire-retardant agents.

4. no

5. compressive

6. 1/4"

7. 5

8. improves freeze-thaw characteristics

9. Units come with dimensions in 4" multiples.

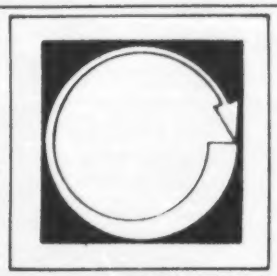
10. Its regular shape takes more time to lay.

11. primary bonding material between masonry units

12. tiles, grout, mortars, mastics, sealers, screed

13. no

Post Assessment



Answer the following questions in the spaces provided.

1. Name the 5 types of base material for plaster.

2. Name two properties that lime gives to plaster.

3. What function do aggregates perform in plaster?

4. Why is it called gauging plaster?

5. What function do aggregates perform in concrete?

6. Name at least 2 types of concrete additives.

7. Name the 4 major categories of masonry units.

8. Are concrete blocks all solid?

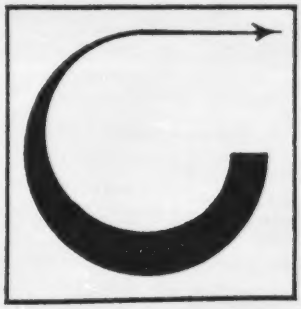
9. What are at least 4 of the characteristics mortar must present in order to be satisfactory?

10. What function do mortars perform in tile setting?

11. What is the primary function of tile sealers?

12. What are screeds used for in tile setting?

Instructor Post Assessment Answers



1. gypsum board lath, metal lath, welded or woven wire paper base, masonry bases, wood lath

2. plasticity, retard drying

3. provide bulk and increase coverage may provide texturing properties

4. Because it is formulated to allow you to "gauge" or determine the plaster's rate of setting.

5. Provide bulk

6. any two: coloring agents, air entraining agents, hardening agents, setting agents, curing agents

7. brick, hollow clay tile, blocks, stone

8. no

9. any four: workability, water retentivity, consistant rate of hardening, bond, durability, strength, appearance

10. leveling of sub-surface

11. to protect tile surface

12. to provide a leveling guide